

## **REMARKS**

The Office Action dated May 15, 2007 has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

Claims 1 and 8 have been amended to more particularly point out and distinctly claim the subject matter which is the invention. Claims 2-5 and 9-11 have been withdrawn. No new matter has been added. Claims 1 and 6-8 are submitted for reconsideration.

Claims 2 and 4-8 were rejected under 35 U.S.C. 112, second paragraph as being indefinite. The claims have been amended to overcome the rejection. Therefore, Applicants request that the rejection be withdrawn.

Claims 1, 2 and 4-8 were rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Publication No. 2003/0185649 to Mizuno (hereinafter Mizuno). The rejection is traversed as being based on a reference which does not teach or suggest each of the features recited in claims 1, 2 and 4-8.

Claim 1, upon which claims 6-8 depend, recites a tapping screw including a head portion and a shaft portion extending from the head portion, and forming a female screw in a prepared hole formed in an attached member, while a tip portion of the shaft portion is screwed into the prepared hole. The shaft portion has a columnar constant diameter portion extending from the head portion and having a constant diameter and a reduced diameter portion of a truncated cone shape extending from the tip of the constant

diameter portion in the direction opposed to the head portion, and reduced in diameter as it is advanced in the direction opposed to the head portion. The shaft portion also includes a spiral screw thread continuously formed over the outer circumferential face of the constant diameter portion and the outer circumferential face of the reduced diameter portion. Plural notch portions are formed in the screw thread in the circumferential direction of the shaft portion, all the notch portions having a notch face, a rising wall and a corner portion. The notch portions are formed by form rolling. The notch portions are shallow such that the core diameter of each notch portion is larger than the core diameter of the screw thread at the same location. Each notch face has a stem face notched and is formed radially inward from a crest of the screw thread. Each rising wall is perpendicular to the screw rotating direction. Each corner portion is formed at a diametrical outside end of the rising wall. The stem face has one end connected in a position moved a predetermined angle  $\alpha$  from the corner portion to a backward side in the rotating direction for removal, and also has a surface moved radially inward as it proceeds to the backward side in the rotating direction, and further has another end connected to the end of the rising wall on its diametrical inside.

As outlined below, Mizuno does not teach or suggest each of the features recited in the pending claims.

Mizuno discloses a male screw part including a head and a shank portion extended from the head and formed with screw threads, and that is adapted to be screwed into a mating female screw part. The screw threads disposed in the vicinity of a tip end of the

shank portion in a direction of screwing are formed with at least one notch in a heightwise direction thereof. The notch has edges intersecting with a ridgeline of the screw threads. A root diameter of the notch is larger than an inner diameter of the female screw part.

Applicants submit that Mizuno does not teach or suggest each of the elements recited in the pending claims. Each of the pending claims, in part, recites a tapping screw including a head portion and a shaft portion extending from the head portion, and forming a female screw in a prepared hole formed in an attached member, while a tip portion of the shaft portion is screwed into the prepared hole. Each of the pending claims also recites, in part, that the stem face has one end connected in a position moved a predetermined angle  $\alpha$  from the corner portion to a backward side in the rotating direction for removal, and also has a surface moved radially inward as it proceeds to the backward side in the rotating direction, and further has another end connected to the end of the rising wall on its diametrical inside. Mizuno does not teach these features.

An embodiment of the present invention, as recited in the pending claims, is directed to a tapping screw capable of forming a female screw into a prepared hole of an attached steel plate, for example, a high-tension material which thickness is about 1 mm. The stem face of the tapping screw is notched widely on the circumference from the position moved by a predetermined angle  $\alpha$  (approximately 20 degrees) from the corner portion to a backward side in the rotating direction for removal to the radially inward end of the rising wall. This makes it possible to reduce tightening torque when forming the female screw

because the contact area with a prepared hole of an attached steel plate is reduced. Based on the present invention, leading performance into the prepared hole of the attached steel plate is better by the rising wall, which is formed perpendicularly at a backward side in the rotating direction for removal of the stem face. This also makes it possible to securely form the female screw. By securely forming a female screw, it makes possible to reduce torque when tightening the constant diameter portion thereafter.

Mizuno, on the other hand, is used for a screw nut which has a female screw in advance. The purpose of Mizuno is to secure the screw by removing attached material, such as paint, of a female screw with a notch portion when tightening the screw. Mizuno disclose only three "plural notches 12", for each circumference, which is small and notched with a straight line on the screw thread to remove the paint. Figure 3 of Mizuno shows a first angle,  $\theta_1$ , which is the angle between the valley flank 14 and a normal line H extending from a center of axis of the shank portion 5 of the male screw part 1, and a second angle,  $\theta_2$ , which is the angle between the valley flank 15 and the normal line H. The first angle is preferably smaller than the second angle. According to the disclosure of Mizuno, if  $\theta_2$  is the largest at  $180^\circ$  from H, the plural notches 12 are not big when compared to the circumference area. Also, in Mizuno, if the plural notches 12 become bigger, a screw is going to slacken over time after being fixed. Therefore, in view of the purpose of Mizuno,  $\theta_2$  cannot be bigger than  $180^\circ$ . In addition, as to the rising wall of Mizuno, it is not perpendicular because the torque increases if  $\theta_1$  become  $0^\circ$ .

As noted above, the tapping screw of the present application forms a female screw into a prepared hole of an attached steel plate such as high tension material. The present invention, as recited in the pending claims, forms a female screw surely because the perpendicular rising wall leads to and is fixed with an attached steel member. Therefore, the present invention, as recited in the pending claims, reduces tightening torque by the wide contact area of the stem face and has a perpendicular rising wall in the back. In the present invention, by forming a female screw surely, the tightening torque is thereafter reduced. Mizuno's purpose is to prevent a loose tightening by removing paint of the screw nut which has a female screw in advance. Therefore, as to the screw of Mizuno, there is no motivation to provide a wide stem face over the circumference. There is also no teaching, suggestion or motivation in Mizuno to make a rising wall perpendicular. Based on the arguments presented above, Applicants request that the rejection under 35 U.S.C. 102(e) be withdrawn because Mizuno does not teach or suggest each of the elements recited in claims 1 and 6-8 thereon.

As noted previously, claims 1 and 6-8 recite subject matter which is neither disclosed nor suggested in the prior art references cited in the Office Action. It is therefore respectfully requested that all of claims 1 and 6-8 be allowed and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by

telephone, the applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,



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